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(71) Applicant (*for all designated States except US*): **PLASTIC CORES LIMITED** [GB/GB]; Drakes Industrial Estate, Shay Lane, Halifax, West Yorkshire HX3 6RL (GB).

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(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **SMITH, David** [GB/GB]; Drakes Industrial Estate, Shay Lane, Halifax, West Yorkshire HX3 6RL (GB).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(74) Agents: **NEILL, Alastair, William et al.**; Appleyard Lees, 15 Clare Road, Halifax HX1 2HY (GB).

(54) Title: INTERLOCKING DEVICES

(57) Abstract: An interlocking device for locking components together is provided, comprising at least one first tubular component (1), at least one second component (2), arrangeable to interconnect with the first component, the second component (2) having an opening which, in use, lies within the hollow interior of the first component (1). There is also at least one third component (3, 4) insertable into the opening to lie within the hollow interior of the first component (1), thus locking all three components together. Figure 1 illustrates a first embodiment of the invention in which the first and second components comprise intersecting members of a pallet. In another embodiment, the components are used to construct a fence. The invention enables a very robust structure to be assembled without the use of tools.

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INTERLOCKING DEVICES

The invention relates to interlocking devices, and particularly to devices for locking components together, for a variety of purposes.

5

The invention provides an interlocking device for locking components together, comprising a first tubular component, a second component arrangeable to interconnect with the first component, the second component having an opening which, in use, lies within the hollow interior of the first component, and
10 a third component insertable into the opening to lie within the hollow interior of the first component thus locking all three components together.

The invention enables components to be interlocked in a very robust and secure manner, without the use of special tools.

15

The second component may fit into a slot in a side wall of the first component.

One embodiment of interlocking device according to the invention comprises a pallet in which a plurality of second first components are spaced apart to
20 comprise main structural members of the pallet and a plurality of said second components are spaced apart to comprise secondary structural members of the pallet.

Many industries produce rolls of their product, from paper and plastic to steel.
25 Cylindrical loads such as these rolls need a product (usually a pallet) to assist in handling, storage and transportation.

A pallet according to the invention may be shaped to support a cylindrical load such as a roll, the secondary structural members comprising cross members
30 which act as chocks to retain the roll in position.

Thus, this embodiment of the invention enables rolls to be palletised without the need for strapping. The embodiment also allows the rolls to be handled by the various derivatives of forklift and pallet trucks. The embodiment enables rolls to be stored in racking and can be used for transporting and shipping of the rolls.

This embodiment may be such that the position and height of the chocks can be varied during construction to accommodate any desired size and weight of cylindrical load.

An additional chock may be provided to aid loading and unloading. Such a chock can be used to prevent the roll from overshooting during loading.

If desired a saddle may be provided to support a roll, instead of or in addition to chocks.

In another embodiment of the invention, the second component fits into an aperture extending through side walls of the first component.

For example the interlocking device may comprise a fence in which a plurality of said first components are spaced apart to form upright posts of the fence and at least one of said second components extends between at least two uprights to form a cross rail of the fence.

The rails may be set at various angles to allow the fence to change direction, for example to go round corners.

An upright post may be secured into ground using foundation bars.

Laths or panels may extend between spaced apart upright posts.

The interlocking device may be such that two third components are inserted into each second component, the two third components being spaced apart to abut respectively against opposite inner walls of the first component, thus preventing the second component from moving with respect to the first component.

Each component may comprise a tube and the tubes may have a substantially square cross section.

The components may be made from plastics material, metal or wood, or from a combination of these materials.

By way of example, specific embodiments of the invention will now be described, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of one embodiment of the invention comprising a pallet;

Figure 2 is a side view of the pallet, showing the inside of the main structural members of the pallet;

Figure 3 is a perspective view showing the pallet in use;

Figure 4 is a side view of a second embodiment of the invention comprising a fence;

Figure 5 is a perspective view of the fence shown in Figure 4; and

Figure 6 shows an alternative method of fixing an upright post of the fence.

The pallet shown in Figure 1 comprises three main structural members 1, intersecting with four secondary structural members 2.

Each of the secondary structural members 2 fits within a slot 5 cut into a side wall of the main structural members 1.

- 5 Where each secondary structural member 2 lies within one of the main structural members 1, the secondary structural member has two square cross-section passageways passing through its side walls.

10 In order to lock the structural members together, smaller, square cross-section components 3 and 4 are pushed inside the main structural members 1 to slide into the square apertures in the side walls of the secondary structural members 2, as shown in Figure 2.

15 It will be seen that the components 3 abut against one upper corner of a main structural member 1, and the components 4 abut against an opposite upper corner of a structural member 1. This produces an extremely robust construction and locks the secondary components 2 against movement with respect to the main structural components 1.

20 The holes in the side walls of the members 2 are made slightly undersize, so that the components 3 and 4 have to be forced into position so that they are then securely held in place by frictional forces.

25 All the components shown in Figures 1 and 2 are initially constructed by extruding plastics material.

30 The two inner secondary structural members 2 are of slightly greater height than the outer two members and they thus provide a chocking effect when a cylindrical load such as a roll is placed on the pallet. Such a roll is shown at 6 in Figure 3.

The arrangement of the components allows variations in roll size to be catered for and the height of the members 2 can be pre-selected during manufacture to provide varying levels of resistance to movement.

- 5 A secondary chock 7 may also be used.

The embodiment of the invention shown in Figure 4 comprises a fence made up of vertical upright posts 8 and cross rails 9.

- 10 With this embodiment, instead of fitting into side slots, the rails 9 pass through rectangular apertures 10 (see Figure 6) in the posts 8. Each rail 9 has a pair of square holes passing vertically down through the rail where each rail lies within one of the posts 8. This enables smaller, square cross section locking components 11 and 12 to be forced down into the posts 8, from the top of the
- 15 posts, to pass through the holes in the rails 9 and thus lock all the components together. Each component 11 abuts against one inner wall of a post 8 and the other component 12 abuts against the opposite inner wall of a post 8, so that the rails 9 are locked against movement with respect to the posts 8.
- 20 After the locking components 11 and 12 have been inserted, caps 13 are fitted onto the posts.

The arrangement shown in Figures 4 and 5 has foundation bars 14 fitted to the bottom of the posts 8 to facilitate location of the posts in the ground.

25

In the alternative arrangement shown in Figure 6, the posts 8 are provided with base plates 15 which can be bolted to a support surface.

- Although the fence arrangement shown in Figures 4 and 5 extend in a straight
- 30 line, apertures 10 may be provided in adjacent faces in some of the posts so that a fence can be constructed having 90° corners.

The fence posts 8 may not necessarily be square, and apertures 10 may be provided at angles other than 90°, to enable any particular fence to change direction with any desired angle.

- 5 The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

10

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually
15 exclusive.

20

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated
20 otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

25

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the
25 features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. An interlocking device for locking components together, comprising a first
5 tubular component, a second component arrangeable to interconnect with the
first component, the second component having an opening which, in use, lies
within the hollow interior of the first component, and a third component
insertable into the opening to lie within the hollow interior of the first
component thus locking all three components together.
- 10 2. An interlocking device as claimed in Claim 1, in which the second
component fits into a slot in a side wall of the first component.
3. An interlocking device as claimed in Claim 2, comprising a pallet in which
15 a plurality of said first components are spaced apart to comprise main
structural members of the pallet and a plurality of said second components are
spaced apart to comprise secondary structural members of the pallet.
4. An interlocking device as claimed in Claim 3, in which the pallet is shaped
20 to support a cylindrical load such as a roll, the secondary structural members
comprising cross members which act as chocks to retain the roll in position.
5. An interlocking device as claimed in Claim 4, such that the position and
height of the chocks can be varied during construction to accommodate any
25 desired size and weight of cylindrical load.
6. An interlocking device as claimed in Claim 4 or Claim 5, in which an
additional chock is provided to aid loading and unloading.
- 30 7. An interlocking device as claimed in Claim 1, in which the second
component fits into an aperture extending through side walls of the first
component.

8. An interlocking device as claimed in Claim 7, comprising a fence in which a plurality of said first components are spaced apart to form upright posts of the fence and at least one of said second components extends between at least two uprights to form a cross rail of the fence.

9. An interlocking device as claimed in Claim 8, wherein rails can be set at various angles to allow the fence to change direction, for example to go round corners.

10. An interlocking device as claimed in Claim 8 or Claim 9, where an upright post is secured into ground using foundation bars.

11. An interlocking device as claimed in any one of Claims 8 to 10, wherein laths or panels extend between spaced apart upright posts.

12. An interlocking device as claimed in any one of the preceding claims, in which two third components are inserted into each second component, the two third components being spaced apart to abut respectively against opposite inner walls of the first component, thus preventing the second component from moving with respect to the first component.

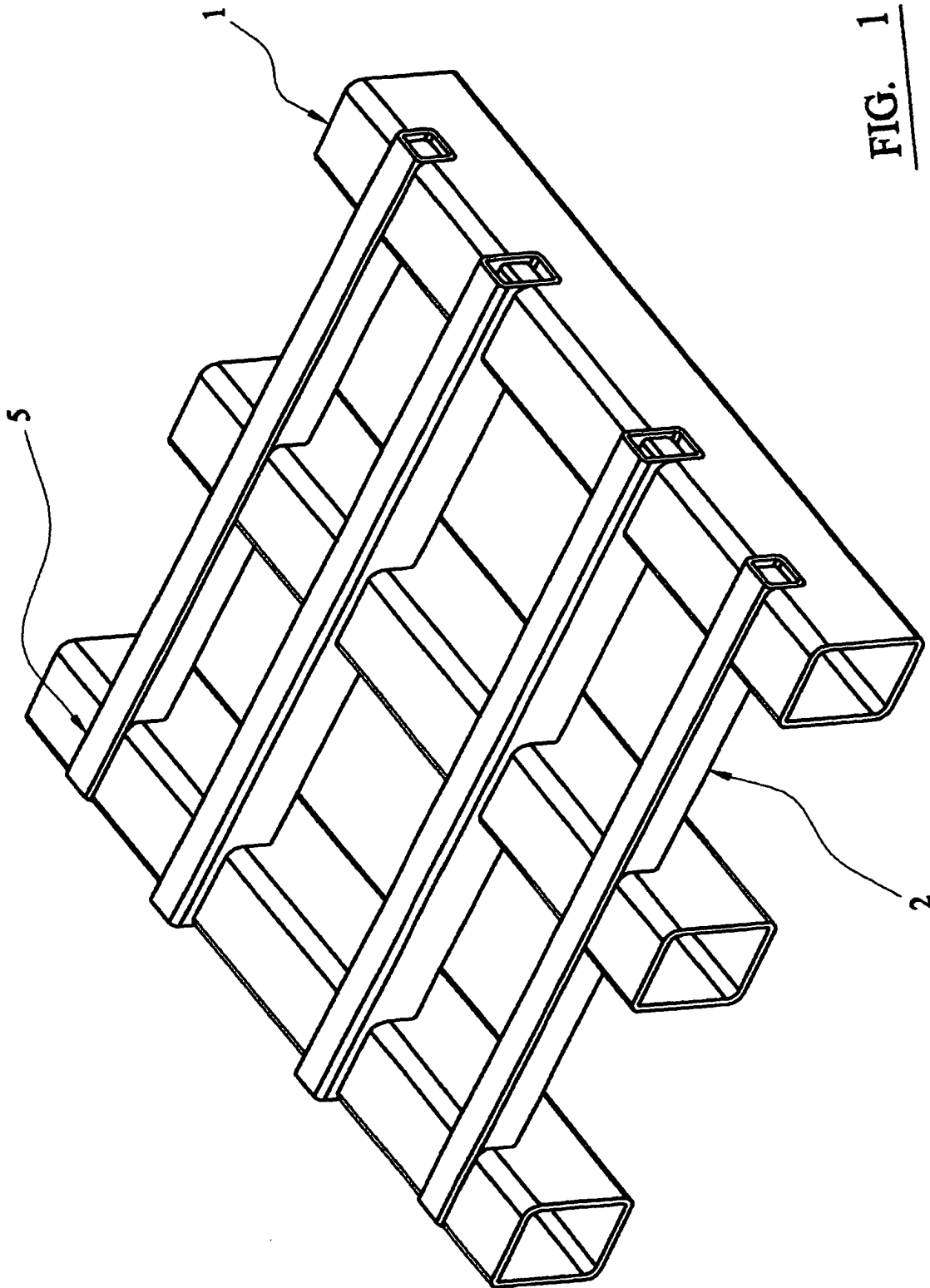
13. An interlocking device as claimed in any one of the preceding claims, in which each component comprises a tube.

14. An interlocking device as claimed in Claim 13, in which the tubes have a substantially square cross-section.

15. An interlocking device as claimed in any one of the preceding claims, in which the components are made from plastics material, metal or wood or from a combination of these materials.

16. An interlocking device substantially as herein described, with reference to and as illustrated in the accompanying drawings.

-1/6-



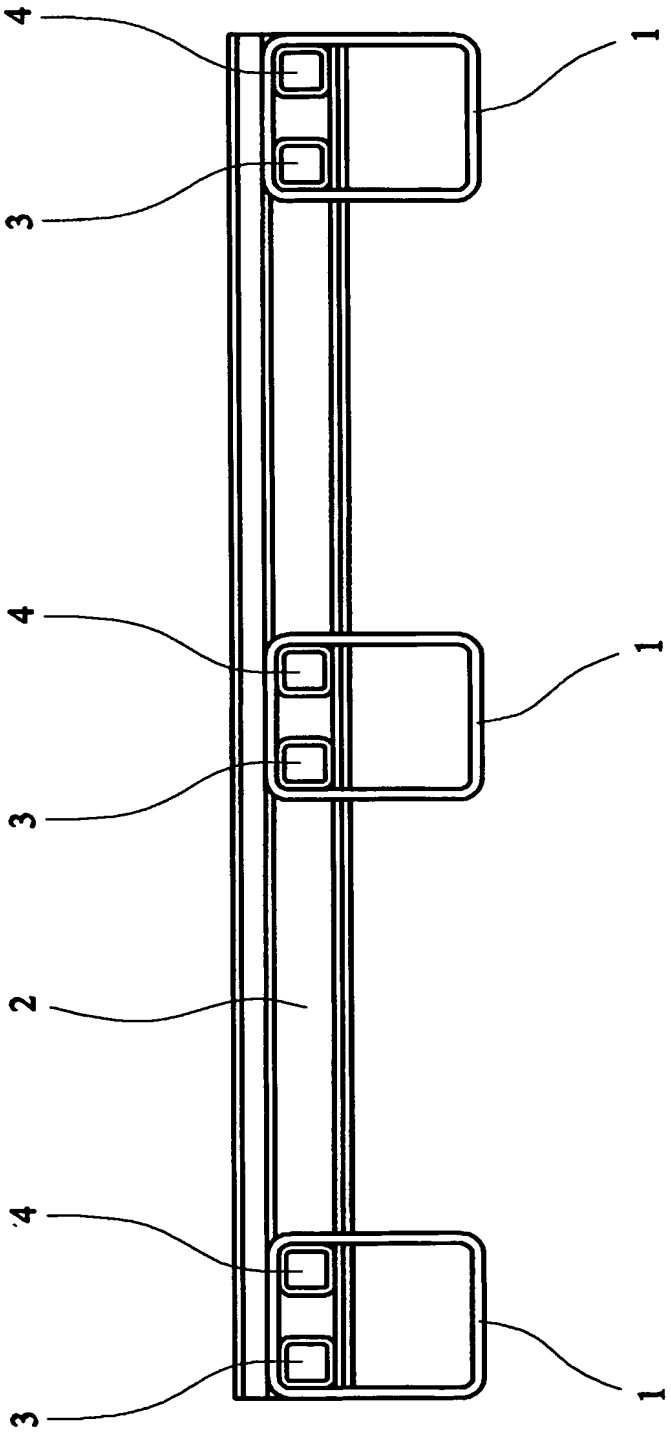


FIG. 2

-3/6-

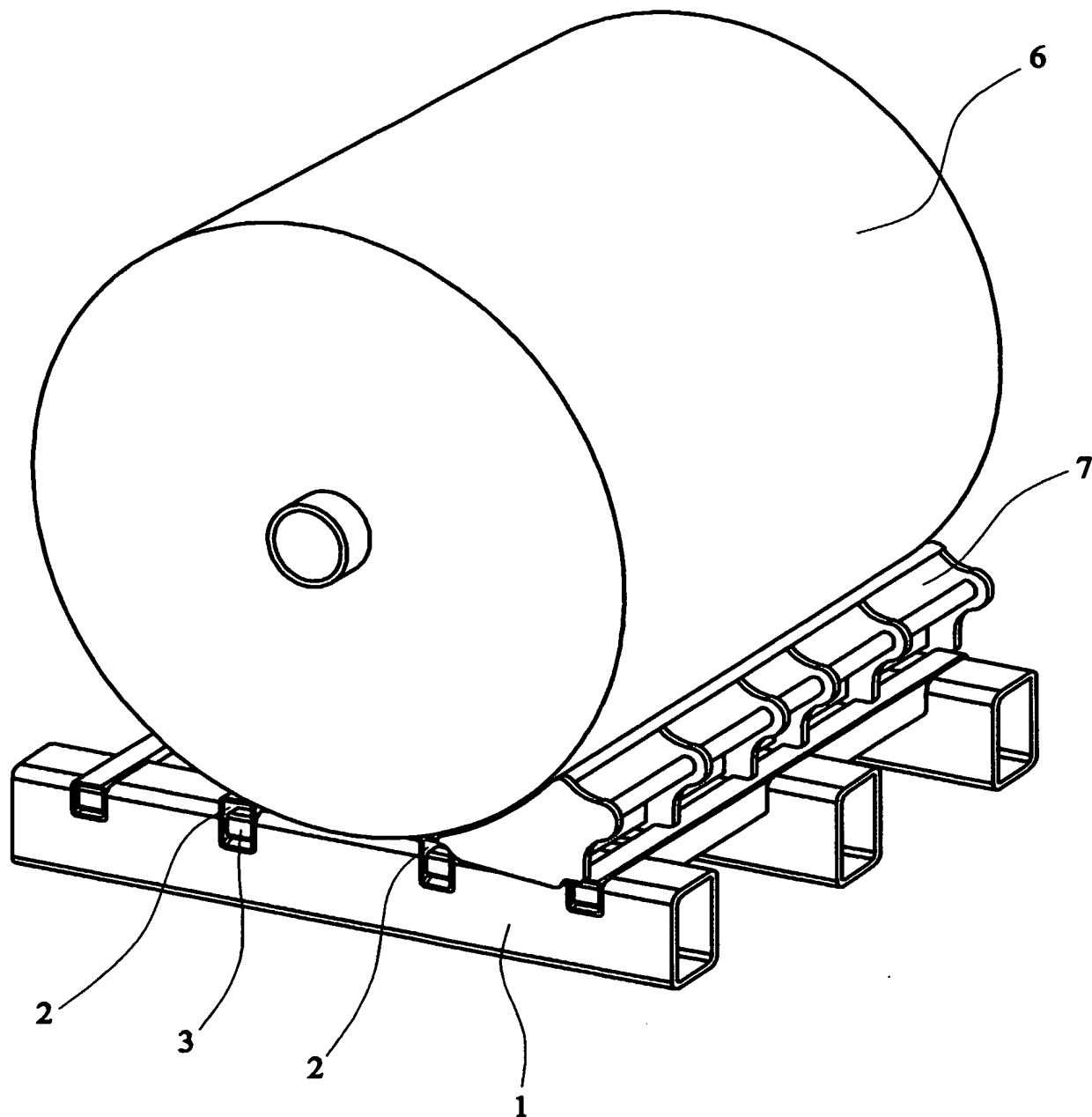


FIG. 3

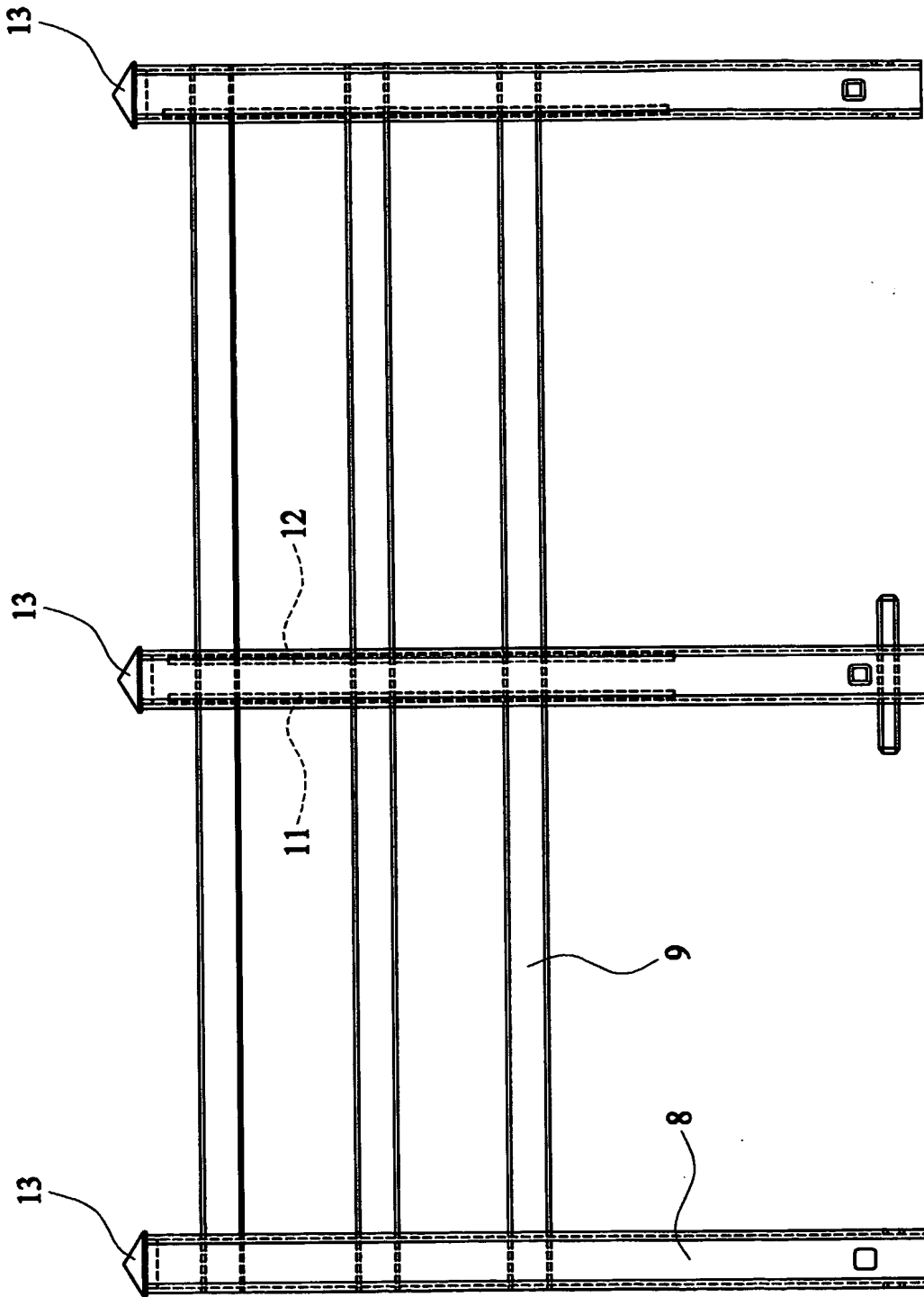


FIG. 4

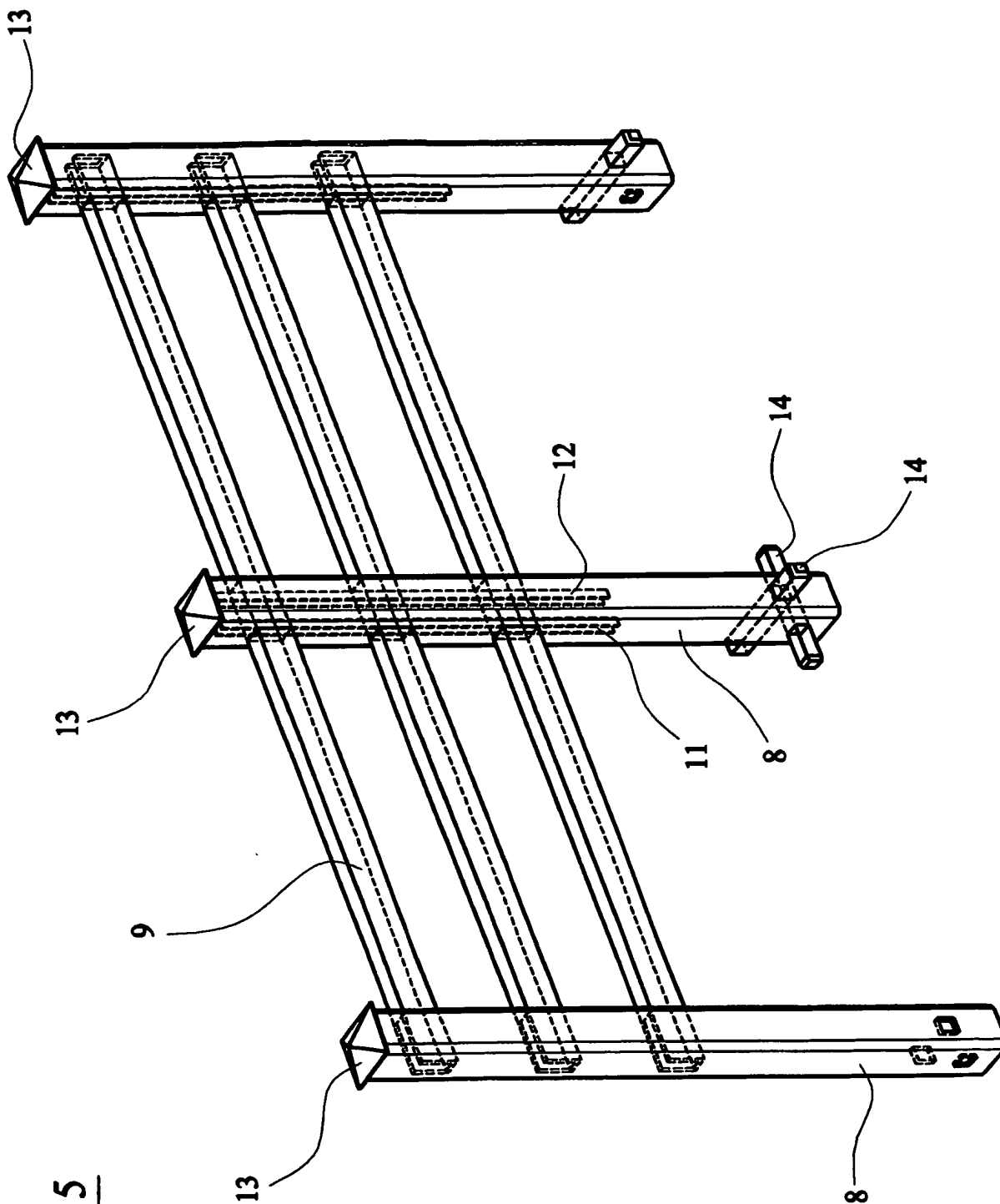


FIG. 5

-6/6-

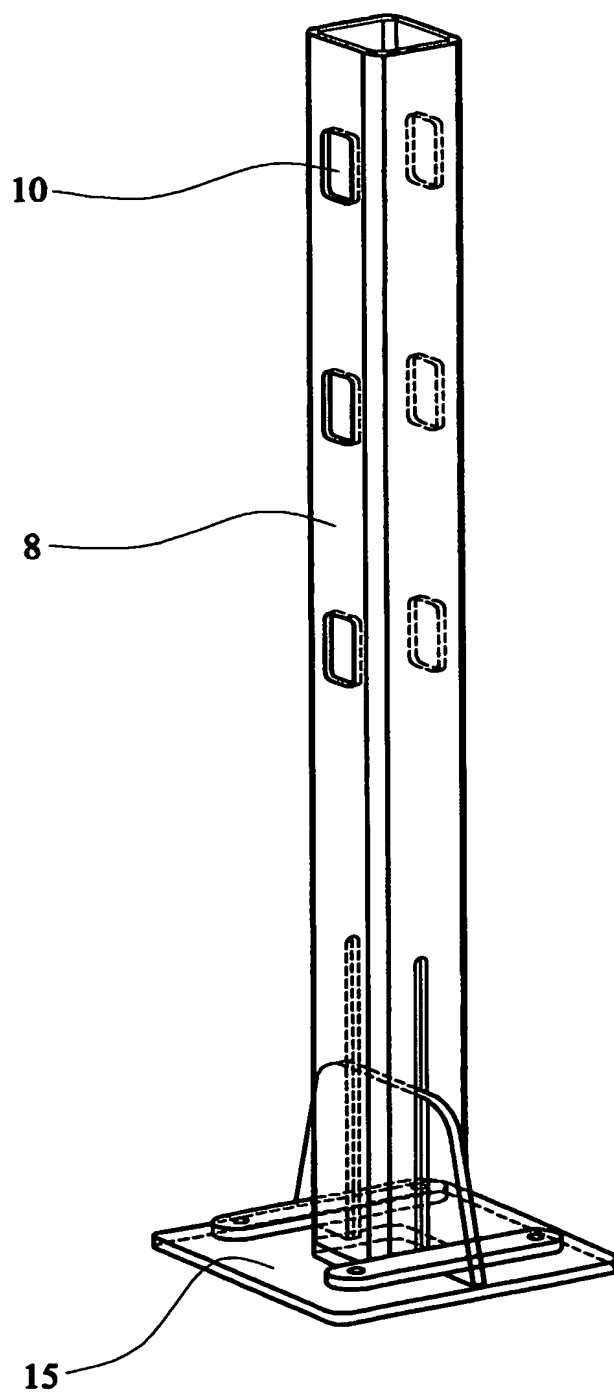


FIG. 6

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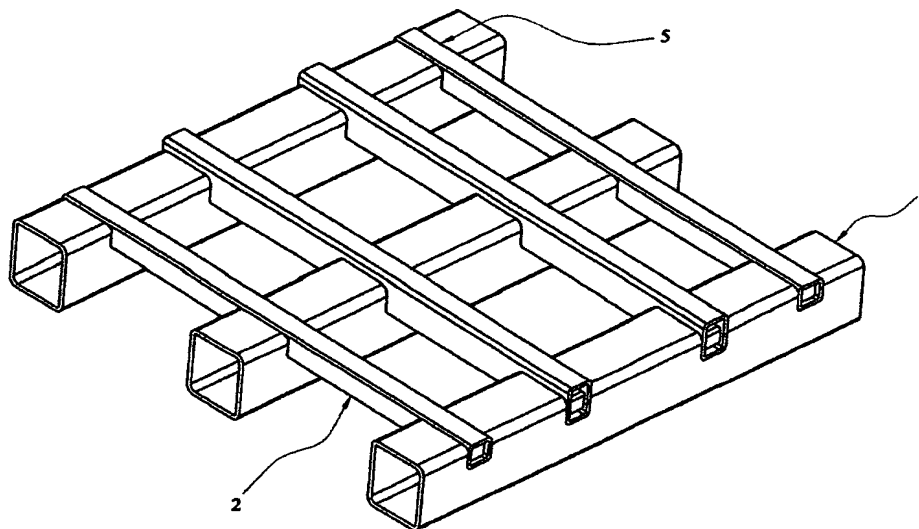
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- (74) Agents: NEILL, Alastair, William et al.; Appleyard Lees, 15 Clare Road, Halifax HX1 2HY (GB).
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- (71) Applicant (*for all designated States except US*): A-FAX LIMITED [GB/GB]; Drakes Industrial Estate, Shay Lane, Halifax, West Yorkshire HX3 6RL (GB).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): SMITH, David [GB/GB]; Drakes Industrial Estate, Shay Lane, Halifax, West Yorkshire HX3 6RL (GB).
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[Continued on next page]

(54) Title: INTERLOCKING DEVICES



(57) Abstract: An interlocking device for locking components together is provided, comprising at least one first tubular component (1), at least one second component (2), arrangeable to interconnect with the first component (1), the second component (2) having an opening which, in use, lies within the hollow interior of the first component (1). There is also at least one third component (3, 4) insertable into the opening to lie within the hollow interior of the first component (1), thus locking all three components together. Figure 1 illustrates a first embodiment of the invention in which the first and second components comprise intersecting members of a pallet. In another embodiment, the components are used to construct a fence. The invention enables a very robust structure to be assembled without the use of tools.



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

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T/GB 03/00036

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D19/38 B65D19/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 654 877 A (BARRETT LAWRENCE G) 11 April 1972 (1972-04-11) column 3, line 19 - line 68 figures 1-14, 18-21	1-3, 7, 15
Y		8-14
Y	US 5 119 740 A (CARTER LEEWOOD C) 9 June 1992 (1992-06-09) the whole document	8-11
A		1, 7
Y	US 3 256 839 A (PETERSON ALAN A ET AL) 21 June 1966 (1966-06-21) figure 1	12
A		1-3
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

1 July 2004

Date of mailing of the international search report

12/07/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Schultz, O

INTERNATIONAL SEARCH REPORT

national Application No

PCT/GB 03/00036

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 735 154 A (HEMERY ANDRE) 5 April 1988 (1988-04-05) column 2, line 33 - line 41 figure 1	13,14
A	-----	1,15
X	US 4 869 179 A (SMITH LARRY D ET AL) 26 September 1989 (1989-09-26) column 3, line 67 - column 4, line 5 figures 1-7,9	1-3
A	-----	7,12-15
X	US 6 186 077 B1 (LIM BANG-HOON ET AL) 13 February 2001 (2001-02-13) figures 1-3b,5,6,7b	1-3
A	-----	7,12,14, 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 03/00036

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 16
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 16

Rule 6.2(a) PCT and Article 6 PCT

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

national Application No

Γ/GB 03/00036

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